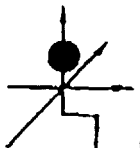


② R. G. Snyder's letter to Takao Kawakita

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APR 25 '89 11:03 BIODYNAMICS INTL



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24 April, 1989

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Dr. Takao Kawakita
Chairman
Organizing Committee for UENA-MURA Seminar
12-13, Hata I-chome, Ikeda-shi
Osaka-fu, 563 Japan

Dear Dr. Kawakita:

I was pleased to have had the opportunity to meet with you so extensively during the Society of Automotive Engineers S-9 Air Transport Safety meeting in New Orleans. Although you had previously provided me with much background information in prior communications, I now have a much greater understanding of the objectives and course of action you are following.

I have examined with care the excellent English translation that you provided me of the official report of the Boeing 747 JAL accident. I frankly was appalled and disappointed at the complete lack of human factors investigation and of any consideration of survivability factors. Much valuable information was not provided which would have allowed evaluation of the factors contributing to trauma, and particularly concerning the survivability of the four passengers who survived, and possibly others who died subsequently.

As a result, I wholeheartedly support your efforts for improvement of survivability on behalf of the 8.12 REHRAKUKAI, The Associated Bereaved Family Members of JAL 123 accident, as well as your concept and program for a UENO-MURA Seminar to provide education on the subject.

The dedication and professional approach which you are taking is impressive. While improvements often occur in increments smaller and slower than they should, the effects of an organized group as yours will certainly get the attention of responsible government and industry officials, and focus on the necessity for not only getting better investigations when accidents do occur, but also the critical need for upgrading current and future air transports to the state of the art of occupant crash protection. In so doing, it brings more meaning to the tragic loss of life in this accident.

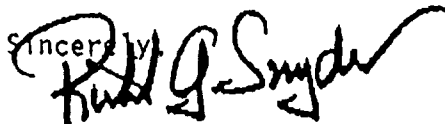
Unfortunately, I now find that my schedule precludes accepting your kind invitation to participate in the seminar that you have scheduled in August, as I must testify in court at that time. I sincerely regret that this is the case, and feel badly that I must decline to come.

I had originally indicated my interest on a tentative basis since I could not know that far ahead whether I would have a conflicting commitment. For this reason I find that I am seldom able to present scientific papers anymore because of legal schedules that are not predictable. It is my recommendation that either C.O. "Chuck" Miller, who has recently retired from the National Transportation Safety Board (NTSB), or Richard Chandler, who has just retired from the Federal Aviation Administration (FAA), as Chief of the Protection and Survival Laboratories, would be excellent choices for your seminar.

While I cannot accept your gracious offer, please understand that I will be honored to continue to assist you in providing a background data basis. I hope that the technical publications I have provided will be of some use in understanding what may be done, and that most plane crashes should be survivable.

Please feel free to contact me in anyway that I may further help your movement. As you know, I have lost two pilot sons, and have myself survived five airplane crashes. For some 30 years I have dedicated myself to research attempting to improve occupant safety in crash impact environments.

Please extend my heartfelt sympathy to all of the bereaved family members.

Sincerely,


Richard G. Snyder, Ph.D., D.ABFA
President

Professor Emeritus
The University of Michigan

①AAIC Report English translation

3.2.10 Analysis on death and injury of passengers and crewmembers

We studied the impact of crash, and death and injury of passengers and crewmembers.

3.2.10.1 Death and injury of passengers and crewmembers in forward portion of fuselage

It is considered that passengers and crewmembers in the fore portion from around BS1480~1694 of the fuselage were all instantaneously killed by the shock estimated as much as several hundreds of g as well as the total destruction of structures of the fore fuselage at the time of crash (*1).

(*1) Human ability of anti-g tolerance varies in relation to the direction of g (impact acceleration), the method of body-restraint with seat, belt, etc., and the duration of g load. An example of human ability of anti-g tolerance (limit of g that will not cause fatal injury) which was studied by NTSB (National Transportation Safety Board of the U.S.A.) with regard to aircraft crashes is shown below.

Document: NTSB-AAS-81-2, Cabin Safety in Large Transport Aircraft, 1981

Duration of g: 0.1~0.2 sec.

Rate of onset: 50g/ sec.

(restrained by belt)

<u>Direction of g</u>	<u>Magnitude of g</u>
Forward	20~25
Downward	15~20
Sideward	10~15
Upward	20

3.2.10.2 Death and injury of passengers and crewmembers in rear portion of fuselage

The passengers and crew members in the forward section of the whole rear portion of the fuselage from around BS1480~1694 had possibly received high impact which exceeded 100 g at the time of crash, and thus are considered to be killed almost instantaneously.

The shock persons in the rear section of the whole rear portion of the fuselage were subjected to was of an order of tens of g, and by this shock most of them are considered to have undergone fatal injuries. Moreover, as was described in 3.2.4.2(2) (a), the possibility would be considered high that the flooring, seating, galley, etc. were all destroyed and, together with passengers and flight attendants, spread into the most rear section by the shock at the time of crash and enlarged the extent of injury of persons there by bruise and oppression resulting from the secondary blow with such things. Moreover, it is probable that the impacts during sliding down of the rear portion of the fuselage along the slope of SUGENOSAWA third branch valley would have increased the extent of injury.

3.2.10.3 Four persons survived this accident, but they were all seriously injured. All of them were seated at the rear section of the whole rear portion of the fuselage and are considered to have been subjected to tens of g, but they were able to escape death miraculously. The conceivable reason would be that their seating attitude, way to fasten the belt, status of damage to the seat, status of substances surrounding their body, etc. at the time of collision chanced to help buffer the impact, and that they were less subjected to collision with dispersed internal substances of the fuselage.

3.2.10.4 The assumption described in 3.2.10.1 and 3.2.10.2 was supported by the degree of injuries of persons' bodies and the place where they were found.

①Original AIC Report, pages 121 and 122

あり、地点確認までに時間を要したことはやむを得なかったものと考えられる。

3.2.9.4 救難活動について

墜落地点は、同機の事故対策本部が設置された上野村役場から南西路程約26キロメートルに位置し、本谷林道を神流川沿いにさかのぼり、登山口から約4キロメートル、標高差約600メートルの場所である。また、現場付近は登山道がなく落石の危険が多い山岳地域のため救難活動は困難を極めたが、活動に参加した各機関によって最大限の努力が払われたものと認められる。

3.2.10 乗客・乗組員の死傷についての解析

事故機の墜落時の衝撃及び機体の破壊の衝撃による乗客・乗組員の死傷の状況について検討した。

3.2.10.1 前部胴体内の乗客・乗組員の死傷について

BS1480～1694付近より前方の前部胴体内にいた乗客・乗組員は、墜落地点への衝突時の数百Gと考えられる強い衝撃及びその時点での前部胴体構造の全面的な破壊によって、即死したものと考えられる(*1)。

(*1) 人間の耐G能力は、G(衝撃加速度)の方向及び座席、バンド等による人間の支持方法により、またG負荷の継続時間により変化する。航空事故に関連してNTSB(米国国家運輸安全委員会)が検討した人間の耐G能力(致命的な障害を生じないGの限界)を一例として以下に示す。

資料名 : NTSB-AAS-81-2, Cabin Safety in Large Transport Aircraft,
1981

Gの継続時間 : 0.1秒～0.2秒

Gの立ち上がり : 50G/秒

(ベルト着用時)

Gの方向	Gの大きさ
前方	20～25
下方	15～20
側方	10～15
上方	20

3.2.10.2 後部胴体内の乗客・客室乗務員の死傷について

BS1480～BS1694付近より後方の後部胴体内にいた乗客・客室乗務員のうち、前方座席の者は、墜落地点への衝撃時に100Gを超える強い衝撃を受けた可能性もあり、ほと

んどが即死に近い状況であったと考えられる。後方座席の者が衝突時に受けた衝撃は数十G程度の大きさであり、この衝撃によってほとんどが致命的な障害を受けたものと考えられる。なお、3.2.4.2(2)(ア)で記したように後部胴体内の床、座席、ギャレイ等の相当の部分が乗客・客室乗務員とともに胴体後端部まで飛散したため、それらと衝突して強度の打撲、圧迫を受けるという二次的災害によって障害の程度を深めた可能性が考えられる。さらに、スゲノ沢第3支流側の斜面を落下中の衝撃等によっても障害の程度を深めたことが考えられる。

3.2.10.3 本事故における生存者は4名であり、いずれも重傷を負った。4名とも後部胴体の後方に着座しており、数十G程度の衝撃を受けたものと考えられるが、衝突時の着座姿勢、ベルトの締め方、座席の損壊、人体に接した周囲の物体の状況等がたまたま衝撃を和らげる状況であったために、また、床、座席、ギャレイ等の胴体内部の飛散物との衝突という災害を受けることが少なかったこともあって、奇跡的にも生還し得たものと考えられる

3.2.10.4 遺体の損傷の状況及び収容場所はほぼ前記3.2.10.1及び3.2.10.2の推定を裏付けるものであった。

③ Torao Imanaru's report in Japanese

遺体の身元を追って

一日航ジャンボ機墜落と歯科医師の記録

〈非売品〉昭和61年8月12日

発行 / 群馬県歯科医師会

✓ な、しかも千古未曾有の大事故であったから無理はないと思うが、現場においては、すみやかに指揮系統を張り出して、全員にわかるようにしておくべきである。出来うれば名札を胸につけておくことが、このたびのような大事故の時には特に必要だったのでは、と思う。自分の所属する団体以外の人全然わからないので、当初はどこに聞いたらよいのかとまどったものである。



✓ (遺体損傷の程度を見ると、スチュワーデスの遺体は比較的損傷の度合が少なかったような気がしたが、お客と対面して掛けるているので、バックで突っ込んだので、イスの背もたれに保護されたのではないかと思う。これに対して乗客は頭部の割れたもの、シートベルトよと思われる腰部からの裂断が多かったこと。以上のことからしようと目で考えて、非常時にはイスを進行方向の反対向きにしておければと考える。現に今回の事故でも助かった4人の乗席の部分は、衝突のショックで胴体が折れてその部分はバックで落ちたといわれており、その付近から収容された遺体は比較的損傷が少ないように思われた。

次に頭部の損傷であるが、これは不時着時にとらせる姿勢に問題があるのではと思われる。身体を前かがみにして膝の間に頭を入れるようにと、飛行機に